

# Nutritional habits in Italian university students

Adele Anna Teleman, Chiara de Waure, Valentina Soffiani, Andrea Poscia  
and Maria Luisa Di Pietro

*Istituto di Sanità Pubblica, Università Cattolica del Sacro Cuore, Rome, Italy*

## Abstract

**Introduction.** Dietary habits have been indicated by research as key elements in both disease pathogenesis and prevention and health promotion.

**Materials and methods.** We analyzed data collected from Italian university students regarding consumption of fruits, vegetables, fast-foods, sweets, energizing drinks, and coffee, average number of eating episodes per day and regularity of breakfast habits.

**Results.** 44% of the university student population eats in average at least 1 portion of fruit per day. 22.5% eats at least 2 portions of vegetables per day. 8.5% eats in average 5 times per day with 48.6% declaring an average of 3 eating episodes per day. 11.3% consumes excessive amounts of caffeine. 49.1% of the females reaches the recommended consumption of fruit, compared to only 33.8% of males ( $p < 0.05$ ). 27.7% of females eats at least 2 portions of vegetables per day, compared to 12.0% of males ( $p < 0.05$ ). Excessive coffee drinkers pass from 8.9% in the 18-21 age group to 16% in the 25-30 year old age group ( $p < 0.05$ ).

**Discussion.** This study showed that the eating habits of young adults do not follow national recommendations. Less than 50% of university students eats at least 1 portion of fruit per day and less than 1 out of 4 eats at least 2 portions of vegetables per day. Less than 10% of the students eats in average 5 times per day and more than 1 out of 3 does not have breakfast regularly every morning.

**Conclusion.** Interventions targeting university students are required in order to increase their knowledge on healthy eating habits and to ameliorate their dietary behaviours.

## Key words

- nutrition
- university students
- Italian
- fruit
- vegetables

## INTRODUCTION

Lifestyle factors – such as dietary habits – have been indicated by research as key elements in both disease pathogenesis and prevention and health promotion.

The US Department of Health and Human Services estimated that in the United States unhealthy eating habits, associated with inactivity, every year contributes to 310 000-580 000 deaths, corresponding to more than 13 times the amounts of deaths caused by firearms and 20 times those caused by drug abuse [1]. There is evidence coming both from epidemiological studies and laboratory experiments that demonstrates the role of dietary factors in carcinogenesis and cardiovascular diseases [2]. A diet rich in saturated fatty acids can be associated to a higher risk of coronary heart disease mortality [3]. Finally, an incorrect dietary habit is one of the most important factors, along with insufficient physical activity, in the pathogenesis of primary obesity. Overweight and obesity are becoming a major public health problem on a global level. It is necessary to remember that the direct and indirect cost of overweight and obesity have been calculated to be, for example,

US\$ 2.74 billion in China, and US\$ 8.56 billion in the United Kingdom [4].

On the other hand, studies have proven that a sufficient intake of fruit and vegetables is an important preventive factor towards cardiovascular diseases, some forms of tumors, and all-cause mortality [5-7]. In fact, fresh fruits and vegetables are rich in vitamin, minerals, anti-oxidant agents and fibers.

Within the nutritional scenario, fast-foods merit particular attention because of their wide popularity and of their nutritional composition that is characterized by high levels of fats (especially saturated fats), simple sugars, and sodium. The high dietary salt content of fast-foods is detrimental for health for more than one reason. First of all, dietary salt is a major cause of increased blood pressure. Secondly, recent studies also demonstrate a strict connection between salt intake and increased sugar-sweetened beverage consumption. In fact, dietary salt intake is a major determinant of fluid consumption in general [8]. It is important to underline that sugar-sweetened beverages have been proven to be the single largest source of added sugar, and the

top source of energy intake in countries like the United States and have been clearly associated with a higher risk of overweight/obesity, type 2 diabetes [7], metabolic syndrome, cardiovascular disease, and fatty liver [9]. Recent studies also demonstrate a direct connection between sugar-sweetened beverages and increased blood pressure [10]. As mentioned above, fast-foods are characteristically also rich in fats, especially saturated fats [11]. Diets that are high in fat determine excessive energy intake and are therefore strongly linked to obesity, which is in itself a risk factor for type 2 diabetes [12]. Saturated fats determine a higher risk of cardiovascular diseases and a higher level of low-density lipoprotein cholesterol compared to polyunsaturated fats [13].

Sweets are characterized by a high sugar content which is often found in association with a high fat content. As mentioned above, the consumption of simple sugars has been associated to an increased risk of weight gain, obesity, insulin resistance, type 2 diabetes, and non-alcoholic fatty liver disease. If the sweet processed foods are also rich in dietary fats, these will increase the metabolic effects determined by the simple sugars [12].

Several studies have demonstrated that the quantitative and qualitative aspects of a diet are not the only factors to take in consideration, since people are affected also by the timing of nutritional intake. An elevated meal frequency (> 3 eating episodes per day) has been thought to have a positive influence on body weight regulation, hunger control, and blood markers of health. In fact, it is common practice within the field of weight management to recommend an increase in meal frequency [14]. Furthermore, there are studies that demonstrated an association between low meal frequency and low fruit and vegetable intake [15, 16].

Amongst meals, special importance should be given to breakfast consumption. Studies in children and adolescents have demonstrated that breakfast consumption determined higher levels of blood glucose concentrations and of self-reported energy and fullness and lower levels of self-reported tiredness and hunger. Breakfast consumption also improves some aspects of cognitive function, including memory, test grades, and school attendance. Finally, it appears that breakfast consumption is also associated with a better nutritional profile and, notwithstanding the higher daily caloric intake observed in breakfast eaters, with a lower risk of overweight/obesity [17, 18].

A product which is frequently marketed and becoming increasingly popular especially in the adolescent and young male population is energy drinks [19]. These products are often consumed with the scope of obtaining an enhancement in athletic performance or in body fat reduction. Most energy drinks contain caffeine in combination with other components such as taurine, guarana, carnitine, ginseng, sucrose, pyridoxine, niacin and cyanocobalamin [20]. However, studies show that in these beverages the two ingredients that have the most important metabolic effects are simply the sugars (glucose and fructose) and the caffeine [21]. In fact, while the exact physical and cognitive benefits deriving from the consumption of energy drinks still

remain controversial [22], studies have demonstrated that these controversial benefits would however essentially be attributable to the caffeine and sugar contents [20]. Studies have concluded that the risk of taurine toxicity deriving from energy drink consumption is very low. However, this should not lead to think that energy drinks are free of adverse health effects. In fact, they increase the risk of caffeine overdose or toxicity, which determines symptoms such as insomnia, nervousness, headache and tachycardia [23]. The consumption of energy drinks has also been associated with the increase of substance abuse (alcohol consumption) and of risk-taking behaviors (*i.e.* risk of serious injury, sexual assault, drunk driving, and death) especially among university-aged male athletes [19, 22]. As regards to caffeine, research has found both positive and negative health effects of caffeine on humans. Some studies have shown caffeine's protective effect from glucose tolerance deterioration, type 2 diabetes, Parkinson's disease and some forms of cancer, including liver cancer [24, 25]. However, also negative health effects have been attributed to caffeine. According to some studies, caffeine is a potential risk factor for osteoporosis, and, in high quantities, determines nocive effects on the Sertoli cells and therefore abnormal spermatogenesis [26, 27].

Notwithstanding the evident health benefits deriving from a correct diet, most studies still report widespread unhealthy dietary habits, such as insufficient daily consumption of fruit and vegetables, both in adolescents and adults [28, 29].

Studies in Italian school children revealed that fruit consumption reduced with increasing age. Only 19.8% of 11 year olds, 16.9% of 13 year olds and 16.8% of 15 year olds answered that they ate more than one portion of fruit per day. The percentage of teenagers who do not consume any fruit is low, with only 4.9% in 11 year olds and 13 year olds and 5.5% of 15 year olds. Whereas 12.2% of 11 year olds, 8.9% of 13 year olds and 8.4% of 15 year olds do not consume any kind of vegetable. The percentage of non-vegetable eaters is significantly higher than the percentage that does not eat fruit and shows a decreasing percentage with older age that is similar to that of fruit consumption. The most common answer given by the children was that they ate vegetables 2-4 times a week, corresponding to 25.5% of 11 year olds, 31.9% of 13 year olds and 31.5% of 15 year olds [28].

29% of male and 28% of female 11 year olds, 29% male and 35% female 13 year olds and 32% of male and 36% of female 15 year olds consume sweets daily. Furthermore, the frequent consumption of sugary soft drinks in Italy is not negligible amongst teenagers. The daily consumption of sugary soft drinks is in average lower in females compared to males, with 17% of females compared to 21% of males at age 11, 18% compared to 23% at age 13 and 13% compared to 25% at age 15. Some Italian regions showed to be an exception to this trend [28].

51.9% of 11 year olds, 50.1% of 13 year olds and 46.6% of 15 year olds reported consuming a mid-morning and afternoon snack. While 27.2% of 11 year olds, 23.2% of 13 year olds and 25.4% of 15 year olds declared usually having only an afternoon snack [28].

The regularity of breakfast consumption decreases with increasing age. Amongst 11 year olds 68.5% have breakfast regularly. There is a noticeable decrease to 58.0% amongst 13 year olds and 51.3% amongst 15 year olds. 16.4% of 11 year olds, 24.5% of 13 year olds and 31.7% of 15 year olds usually start the day without having a breakfast [28].

In this part of our study, we analyze the Italian university student population's characteristics in regards to the consumption of fruits, vegetables, fast-foods, and sweets; frequency of food intake; and breakfast habit regularity. We also analyze the university student population's habit in the consumption of energy drinks and of coffee.

## MATERIALS AND METHODS

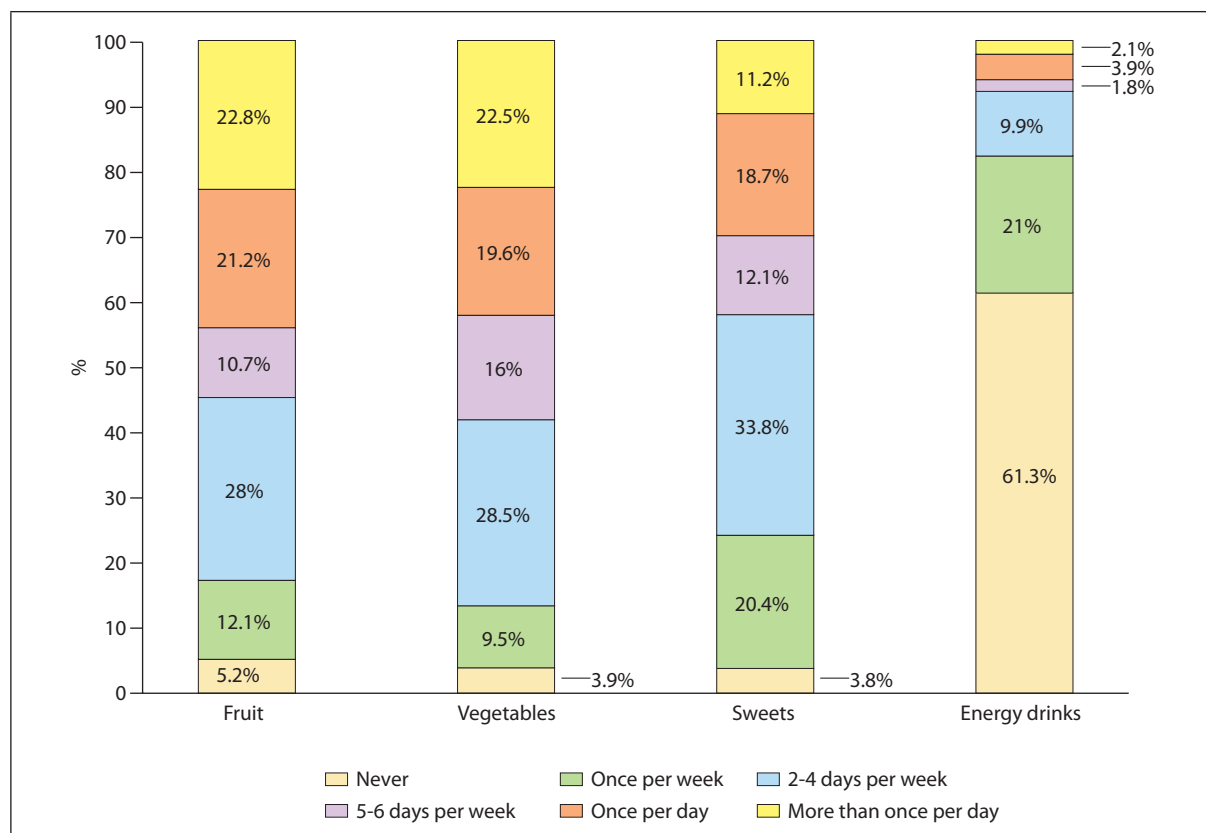
The information regarding the study population and study design, including the development process of the "Sportello Salute Giovani" ("Youth Health Information Desk") questionnaire, the questionnaire contents, the data entry and cleaning, the codification of variables and the sample characteristics, have been previously covered in another paper in this same monograph [30].

In this part of the study, we analyzed data deriving from the questions regarding:

- average number of portions of fruit consumed per week (question 5);
- average number of portions of vegetables consumed per week (question 6);

- average consumption of fast-foods per week (question 10);
- average frequency of consumption of sweets per week (question 7);
- average number of eating episodes per day (question 4);
- average number of breakfasts usually consumed per week (question 3);
- average consumption of energizing drinks per week (question 9);
- average number of coffees per day (question 8).

In this study, we made reference to the Italian Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione guidelines for healthy eating [31]. Considering that the guidelines strongly recommend having breakfast every morning [31], we considered in our analysis that all the answers to the question regarding breakfast frequency that were lower than 7 days per week demonstrate an irregular breakfast eating habit. The guidelines also recommend eating 5 times per day [30]. Therefore, a habit of eating less than 5 times per day was considered a low frequency of eating episodes. Since the current guidelines recommend a minimum of 1-2 portions of fruit and at least 2 portions of vegetables per day [31], we considered all the answers that correspond to a consumption of fruits 5-6 days per week or less and of vegetables once a day or less, as a low frequency of consumption. The guidelines also recommend to avoid intakes greater than 400 mg of caffeine per day, which correspond to 3



**Figure 1**  
Frequency of consumption of fruit, vegetables, sweets and energy drinks.

espresso coffees a day or to 2 cans of common brands of caffeinated energizing drinks. Therefore, all the answers that were greater than an average of 1-3 coffees per day were considered as an excessive intake of caffeine [31].

For each question absolute and relative frequencies were calculated. Furthermore, data were stratified for sex, age class and socio-economic status according to classes described in the methodological article of de Waure *et al.* [30]. Differences related to sex, age class and socio-economic status were evaluated through the chi squared test. A  $p$  value  $< 0.05$  was considered statistically significant. Tables were used to summarize the results.

## RESULTS

The complete tabular presentation of the data regarding this section, including stratification by sex, age class and socio-economic status, can be found in the Appendix which is available online as Supplementary Material at [www.iss.it/anna](http://www.iss.it/anna).

Only 44% of the university student population eats in average at least 1 portion of fruit per day. The most common answer (28.0%) corresponded to a consumption of fruit only 2-4 days per week.

Only 22.5% of the student population eats at least 2 portions of vegetables per day. Similarly to fruit consumption, the most frequent answer (28.5%) corresponded to a consumption of vegetables only 2-4 days per week.

59% of students eats fast-foods 1-2 times per month, while 23.2% declare to not usually consume fast-foods at all.

33.8% of the student population reported eating sweets 2-4 days per week.

Only 8.5% of the university student population eats in average 5 times per day. 48.6% of the students declared an average of 3 eating episodes per day, while 25.8% eats 4 times per day.

In our study, we have observed that only 63.9% of Italian university students regularly have breakfast every morning.

61.3% of students never consumes energizing drinks.

To the question “how often do you usually drink an energizing drink?”, 21.0% answered once a week, 9.9% answered 2-4 days per week, 1.8% answered 5-6 days per week, 3.9% answered once a day and 2.1% answered more than 1 energizing drink per day.

11.3% of university students consumes excessive amounts of caffeine, with 9.0% drinking 4-6 coffees per day and 2.3% drinking more than 6 coffees per day.

## Stratification by sex

49.1% of the females reaches the recommended consumption of fruit, compared to only 33.8% of males ( $p < 0.05$ ).

There is a very noticeable difference between females and males in terms of vegetable consumption. While 27.7% of females eats at least 2 portions of vegetables per day, in the male population this percentage plummets down to 12.0% ( $p < 0.05$ ).

Females tend to eat less fast-foods than males. Of the female population, 25.8% declares to not eat fast-foods and 11.0% eats fast-foods once a week. In comparison, of the male population, 17.9% does not eat fast foods and 16.7% eats fast-foods once a week ( $p < 0.05$ ). Also a very frequent consumption of fast-foods (at least 2 days per week) is much more frequent in males compared to females (8.5% vs 3.3%) ( $p < 0.05$ ).

33% of females in average eats sweets at least 1 time per day compared to only 23.8% of males ( $p < 0.05$ ).

Females showed to have a higher frequency of meal intakes. 84.9% of females declared to eat at least 3 meals per day, compared to only 79.1% of males ( $p < 0.05$ ).

67.7% of females as compared to 55.9% of males ( $p < 0.05$ ) have breakfast every morning.

64.6% of females do not consume energizing drinks compared to 54.5% of males. However, if we consider the heavy consumers of energizing drinks (an average of at least 1 per day) we observe that this corresponds to 6.7% of females and to only 4.5% of males ( $p < 0.05$ ).

Males have a higher risk of consuming too much caffeine. In fact, 14.7% of males consumes 4 or more coffees per day compared to only 9.6% of females ( $p < 0.05$ ).

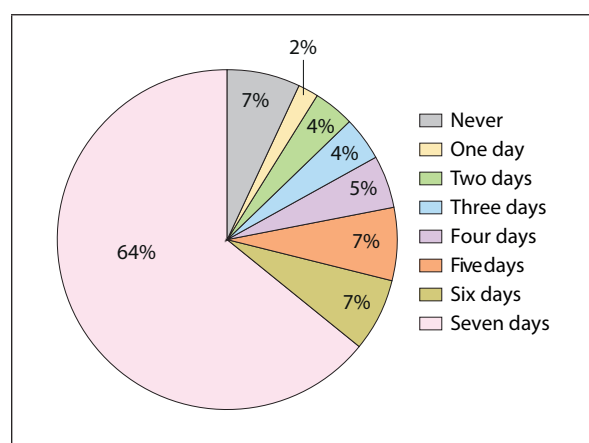
## Stratification by age group

The collected data was stratified and analyzed also by age groups. The analysis yielded significant results with respect to vegetables consumption, frequency of meals and coffee.

The number of students that declared eating at least 2 portions of vegetables per day is directly proportional with age, passing from 20.0% of 18-21 year olds to 23.8% of 22-24 year olds and 26.3% of 25-30 year olds ( $p < 0.05$ ).

The number of students that declared eating at least 3 times per day is inversely proportional with age. 85.3% of students aged 18-21 years old eats at least 3 times per day compared to 81.9% of 22-24 year olds and 79.1% of 25-30 year olds ( $p < 0.05$ ).

The consumption of coffee increases in the older age groups. In fact, while 28.4% of students aged 18-21 never drinks coffee, this percentage decreases to 19.9%



**Figure 2**  
Regularity of breakfast consumption



in students aged 25-30 years, whereas the percentage of excessive coffee drinkers passes from 8.9% in the 18-21 age group to 16% in the 25-30 year old age group ( $p < 0.05$ ).

### **Stratification by socio-economic level**

Socio-economic level was shown to be associated to several habits.

A very frequent consumption of fast-foods is more frequent in the high socio-economic level (13.4%) compared to all the other socioeconomic levels (5.0% of the medium-high, 4.5% of the medium, 5.6% of the medium-low, and 3.4% of the low socio economic level) ( $p < 0.05$ ).

There is also an inverse relation between self-reported socio-economic level and the consumption of at least 1 portion of sweets per day, ranging from 27.7% of students of a high socio-economic level to 31.5% of the low socio-economic level ( $p < 0.05$ ).

There seems to be a slight, yet statistically significant ( $p < 0.05$ ), direct relation between the socio-economic status and meal frequency. In fact, 43.5% eats three times per day in the low socio-economic level group, whilst this percentage increases to 52.9% in high socio-economic level.

The high socio-economic level has a smaller percentage of students who are regular breakfast eaters compared to the other groups (55.5% of the high level group compared to 63.2% of the medium-high, 64.9% of the medium, 65.2% of the medium-low, and 61.2% of the low socio-economic level) ( $p < 0.05$ ).

16.8% of the students belonging to a high socio-economic level consume 4 or more coffees per day as compared to 11.6% of the medium-high level, 10.2% of the medium level, 11.6% of the medium-low level, and 12.7% of the low socio-economic level ( $p < 0.05$ ).

## **DISCUSSION**

This study showed that the eating habits of young adults do not follow national recommendations since less than 50% of university students eats at least 1 portion of fruit per day and less than 1 out of 4 eats at least 2 portions of vegetables per day. Furthermore, less than 10% of the students eats in average 5 times per day and more than 1 out of 3 does not have breakfast regularly every morning.

With respect to fruit consumption, data yielded by this study are aligned with those reported in the Health at Glance report 2014. In fact, even though, across EU member states in average 61% of adults reported a daily consumption of fruit, it is well known that the consumption reaches the lowest level in the population ranging from 15 to 24 years of age. Similar data may be seen as regards to the daily consumption of vegetables, with an European average of 58% and lower consumption levels in the younger portion of the population [32]. Our data also showed that females have better eating habits in comparison to males, as also reported by the OECD and by further evidence [33].

With respect to fruit and vegetables consumption, the World Health Organization suggests eating at least 5 portions (or 400 g) of fruit and vegetables

per day in order to ensure an adequate daily intake of dietary fibre [34] and reduce the risk for chronic diseases [35].

This means that in our sample a very low percentage of people is expected to meet the “5 a day” fruit and vegetable servings recommendation. In this respect, evidence has already shown that the amount of university students consuming at least 5 servings of fruit and vegetables per day is very low, less than 25% [36]. Interventions able to increase vegetables and fruits consumption are indeed needed. The literature suggests that both class-based nutrition interventions, focusing on prevention of chronic diseases [37], and interventions using stage-based newsletters, computer-based communication, and motivational interviewing [38] may effectively increase fruit and vegetable consumption among university students. These initiatives, or similar ones, should be promoted and evaluated also in Italian university students so that the majority of students can adhere to the “5 a day” recommendation.

Another relevant concern is the frequency of breakfast consumption since around 40% of university students were not compliant to the INRAN guidelines. This result is worrisome also because the Third Italian National Food Consumption Survey showed that almost all people (96%) declared to have regular breakfast with a slight decline (91%) in adolescents [39]. Breakfast plays an important role in determining an improved nutrient intake, since it has been associated to a lower daily intake of sugars, saturated fatty acids, solid fats, cholesterol, and sodium and to a higher daily intake of fiber, vitamins and minerals [40, 41]. Furthermore having breakfast is associated with weight control [42, 43]. With respect to this last aspect, the evidence suggests that skipping breakfast is not an effective way to control body weight since people who do not regularly consume breakfast generally have a significantly higher Body Mass Index [40, 44]. Finally, it has been demonstrated that children and adolescents are more likely to have breakfast in families in which the adults also eat breakfast [45]. Therefore, interventions aimed at promoting regular breakfast consumption would help to improve the nutritional status of the whole population.

Around 40% of students reported to consume energy drinks even though with different frequency. This datum is in line with the literature which shows that energy drinks are consumed by 30-50% of adolescents and young adults [46-48]. It should be underlined that evidence shows that the consumption of energy drinks are associated to a decreased academic performance [49] as well as to alcohol consumption [50] and bad sleep quality [51]. Mood and behavioral disorders as well as other conditions associated to the consumption of energy drinks draw attention to this problem.

On the whole, more than 80% of students reported to seldom or never consume fast-foods, a result that is aligned with data deriving from the Third Italian National Food Consumption Survey which reported a percentage of 87% [39]. Even though the percentage of people consuming fast-foods is small, people should

be made aware of fast-foods' salt and fat contents and should be encouraged to consume them rarely.

## CONCLUSION

Based on the results yielded by the survey, it may be suggested that interventions targeting university students are required in order to increase their knowledge on healthy eating habits and to ameliorate their dietary behaviours.

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## Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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